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SOVIET AGRICULTURE: RECENT PERFORMANCE AND FUTURE PLANS

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SOVIET AGRICULTURE: RECENT PERFORMANCE AND FUTURE PLANS

I. Introduction

After over fifty years of Communist rule, the USSR is entering its Tenth Five-Year Plan with reported demonstrations over food shortages.* Paradoxically, during the last decade, agricultural output increased substantially. Yet Brezhnev's program to provide consumers with more meat pushed demand for grain far beyond domestically produced supply.

Under Brezhnev, the USSR's farm sector has received consistently generous support in expanding the resource base. Although rapid growth in investment and in the flow of industrially produced materials such as fertilizer, lubricants, and electric power has helped boost the general level of agricultural production, it has not stabilized farm output. After a series of progressively better harvests in the late 1960s, farm output, especially when measured simply by the size of the grain crop, fluctuated substantially during the past five years. For example, two years after the record 222.5 million ton grain harvest in 1973, the Soviets

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* Le Figaro, May 18, 1976.

suffered their worst crop in a decade -- 140 million tons.*

Two harvest shortfalls during the Ninth Five-Year Plan period (1971-75) wrecked planned goals, slowed economic development, contributed to record hard currency deficits, and jeopardized the gains made by the consumer. The backbone of the regime's consumer program has been a scheduled improvement in diets, symbolized by a rapid expansion of meat output. To attain meat goals quickly, livestock herds were expanded rapidly without first ensuring adequate supplies of feed grains. Had the USSR been favored with an extended period of excellent weather this gamble would probably have paid off. However, the combination of the livestock program's nearly insatiable demand for grain, the leadership's commitment to the consumer, and bad weather forced the Soviets to purchase massive amounts of grain from the West. Grain imports in 1972 were sufficient to avert substantial herd reductions, but even larger grain purchases in 1975 were inadequate to prevent large-scale slaughtering of livestock. The Ninth Five-Year Plan thus ended on a

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* Official Soviet data for grain production are used in this report. Data include production of wheat, rye, barley, corn, oats, millet, buckwheat, rice, and pulses. Figures reported are in " bunker weight " which includes excess moisture, unripe and damaged kernels, weed seeds, and other extraneous materials and has not been adjusted to reflect post-harvest losses incurred in handling and storage.

discordant note, one which will be heard for at least the coming year.

Despite these setbacks there apparently has been no basic change in agricultural policy or the policy to improve the lot of the consumer. After a sharp downturn in 1976, meat production is to increase rapidly during the next four years. Average grain output in 1976-80 is to jump by one-fifth over the average for the previous five years. In addition, the Tenth Five-Year Plan continues the effort to improve the quality of farmland and to increase the use of fertilizer, key factors in raising crop yields. The rate of growth of total investment will be slowed, however. Agriculture's share of total investment will be maintained, but yearly flows of machinery and other investment goods will grow markedly slower than in the past. This slowdown probably does not stem from a policy shift. Instead, it most likely reflects the economy-wide program to increase productivity and product quality in lieu of large new inputs. Planned productivity increases notwithstanding, output plans for key commodities have not been relaxed and are perhaps overly ambitious. Planners are apparently hoping anew for an extended period of better-than-average weather.

This paper briefly reviews the constraints under which agriculture labors, discusses the agricultural achievements

during the past five years -- focusing on agriculture's performance in 1975 and its impact on the rest of the economy -- and examines the Tenth Five-Year Plan goals released thus far.

II. Background

The Soviet farm sector has made considerable progress in the face of serious environmental constraints, constraints that include highly variable weather conditions. Agricultural production generally is sufficient to provide consumers with enough to eat in terms of daily calories, even though their diet is heavily weighted with starches and deficient in meat, vegetables, and fruit. Environmental factors notwithstanding, however, the agricultural sector -- given the resources invested and the products obtained -- suffers from low productivity and ineffective management.

The environmental constraints on agriculture are formidable. Three-fourths of the USSR's sown area is climatically comparable to the Prairie Provinces of Canada and the Northern Great Plains area in the United States. As in these analogous areas, the Soviet Union's agricultural land is relatively deficient in heat, moisture, and nutrients. Almost one-third of the USSR is too cold for

agriculture, and an additional two-fifths is so cold that only hardy, early-maturing crops can be grown. Only in the southern USSR is the available warmth sufficient to permit a wide range of crops. Moisture deficiency is also a major problem. Drought-resistant plant varieties are being developed and dry-farming techniques improved, but irrigation remains the most effective solution. Irrigation, however, is costly in both capital and labor, and in some regions soil deterioration makes the benefits of irrigation difficult to sustain. The Soviet Union has some comparatively good soils, but natural soil fertility supplies only a part of plant nutrient requirements. Proper pairing of soil and crop, correct crop rotation, and large quantities of organic and mineral fertilizers and of trace elements are necessary.

As a result of these and other factors, the farmland of the USSR is less productive than that of the United States. Even with a larger area under crops in the Soviet Union, production is less than in the US (see Table 1). Soviet agricultural output was about 70 percent of the US level in 1960. Since that time the value of Soviet output has increased by about 35 percent and by the early 1970s stood

TABLE 1

USSR AND US: AGRICULTURAL PROFILE, 1974

	USSR	US	USSR as a Percent of US
Agriculture's share of Gross National Product (percent) a/	17.6	2.6	676.9
Agriculture's share of the labor force (percent)	26.3	3.7	710.8
New fixed investment in agriculture per worker as a percent of new fixed investment per worker in industry (percent)	0.5	3.2	640.0
Area sown (million hectares)	216.5	137.4	157.6
Fertilizer application (million tons of nutrients)	15.0	17.5b/	87.5
Stock of agricultural machinery (thousands):			
Tractors	2267	4376	51.8
Trucks	1336	2906	45.9
Combines	673	698	96.4
Agricultural output:			
Food grain; c/			
area (million hectares)	70.0	20.5	341.5
production (million tons)	89.9 d/	43.5	206.7
yield (centners per hectare)	12.8	21.3	60.1
Feed grain; e/			
area (million hectares)	46.6	35.1	132.8
production (million tons)	72.6 d/	133.9	54.2
yield (centners per hectare)	15.6	38.1	40.9
Potatoes (million tons)	81.0	48.6	166.6
Meat (million tons) f/	14.6	17.2	84.9
Milk (million tons)	91.8	52.3g/	175.5

Foctnotes to TABLE 1

a. Share of GNP at factor cost originating in agriculture in 1970 prices for the USSR and in 1972 prices for the US.
b. 1973.
c. Wheat, rye, and rice.
d. Official Soviet production data minus an estimated 3 percent handling loss and an estimated 8 percent waste resulting from excess moisture and extraneous matter. See fcotncte cn page 2.
e. Corn, oats, and barley.
f. Carcass weight equivalent. US data exclude edible byproducts (horsemeat, rabbit, poultry game, edible offal, and lard).
g. Whole milk.
SOURCES: Data are in large part found in Survey of Current Busines and Agricltural Statistics: 1975 for the US, Narodneye khozyaystvo SSSR v 1974 godu for the USSR. Methodology for computing GNP data for the USSR is discussed in USSR: Gross National Product Accounts, 1970, Central Intelligence Agency, A(ER) 75-76, November, 1975.

at about three-fourths of US production.* However, Soviet farm output is still dominated by breadgrains and potatoes -- the USSR normally produces about twice as much wheat as the United States but less than one-tenth as much corn -- while output of higher quality foods, particularly meat and fruit, lags far behind that of the United States and is not sufficient to satisfy the growing demands of the Soviet consumer.

Institutional problems compound the effects of environmental constraints. Agriculture has been structured with emphasis on control rather than efficiency. Moreover, in terms of managment and labor, agriculture historically has been a residual claimant. As a consequence, productivity is low. The USSR maintains more than one-fourth of its labor force in agriculture, a farm labor force eight times the size of the agricultural work force in the United States. Incentives, in the form of both monetary rewards and improved living conditions, have not been sufficient to keep the younger, better-trained workers in the countryside. More

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* For a more comprehensive comparison of agricultural production in the two countries, see F. Douglas Whitehouse and Joseph F. Havelka, "Comparison of Farm Output in the US and USSR", U.S. Congress, Joint Economic Committee, Soviet Economic Prospects for the Seventies, U.S. Government Printing Office, Washington, D.C., 1973.

importantly, the institutional setting has blunted the effectiveness of the massive resources invested in agriculture during the last decade.

III. Plan and Performance, 1971-75

The Ninth Five-Year Plan period was a mixture of success and failure: a period difficult to characterize because of the extreme year to year fluctuation in agricultural output. Years of record and near-record output were interspersed with harvest failures. On balance, though, it must have been a disappointing five years for the leadership. Investment goals were consistently met, but output targets were almost as consistently missed. Moreover, agriculture's problems disrupted overall economic growth, and large expenditures of hard currency were required to buy grain in order to keep the livestock program from total collapse.

A. Agricultural Production

Farm output oscillated during the past five years. For the period as a whole, net production fell at an annual average rate of 0.6 percent, with crop production down 2.2

percent yearly and output of livestock products up 0.7 percent (see Table 2).*

These figures mask agriculture's performance, however, reflecting the good base year 1970 and the disastrous terminal year 1975. In 1971, output held at the 1970 level but dropped 6 1/2 percent in 1972, the result of a severe winter and a summer drought centered in the Volga valley. An expansion in sown area and good weather led to record production in 1973, an increase of almost 15 percent with crop output up 30 percent for the year. The following year, a late summer drought in eastern Kazakhstan, among other problems, cut crop production 12 percent, but livestock products grew 8 1/2 percent, keeping the total value of farm output close to the 1973 record. Finally, in 1975, a prolonged drought that affected most of the Soviet Union's cropland cut the size of the harvest another 11 percent. A shortage of feed led to distress slaughtering of livestock, mainly hogs and poultry. Livestock products were down 7 percent and net agricultural production fell 8 1/2 percent.

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* Net agricultural production is the estimated value of agricultural output for sales and home consumption, using 1970 prices, minus farm products used for seed and livestock feed and including changes in inventories of livestock. For additional tabular material and a short discussion of the methodology used to measure net agricultural production, see the Appendix.

TABLE 2

USSR: PLANNED AND ACTUAL PRODUCUTION OF MAJOR CROPS AND ANIMAL PRODUCTS, SELECTED YEARS

	Average Annual 1966-70 Plan	Average Annual 1966-70 Actual	1971	1972	1973	1974	1975	Average Annual 1971-75 Plan	Average Annual 1971-75 Actual	Average Annual 1976-80 Plan
	--Rate of Growth (Percent)--									
Total value of farm output a/	5.3d/	4.5	0.1	-6.5	14.9	-1.3	-8.4	4.4d/	-0.6	5.5d/
Crops b/	N.A.	5.5	-1.2	-10.7	29.6	-11.8	-11.3	N.A.	-2.2	N.A.
Animal products c/	N.A.	3.7	1.2	-3.2	4.0	8.5	-6.3	N.A.	0.7	N.A.
Production of major farm commodities	--Million Metric Tons--									
Grain	167.0	167.6	181.2	168.2	222.5	195.7	140.0	195.0	181.5	215-220
Potatoes	100.0	94.8	92.7	78.3	108.2	81.0	88.5	106.0	89.7	N.A.
Sugar beets	80.0	81.1	72.2	76.4	87.0	77.9	66.2	87.0e/	75.9	95-98
Sunflower seeds	N.A.	6.4	5.7	5.0	7.4	6.8	5.0	6.8e/	6.0	N.A.
Vegetables	N.A.	19.5	20.8	19.9	25.9	24.8	22.3	24.7	22.7	N.A.
Cotton	5.6-6.0	6.1	7.1	7.3	7.7	8.4	7.9	6.8	7.7	8.5e/
Meat	11.1	11.6	13.3	13.6	13.5	14.6	15.2	14.3	14.0	15.0-15.6
Milk	78.0	80.6	83.2	83.2	88.3	91.8	90.8	92.3	87.5	94-96
Wool (thousand tons)	N.A.	398	429	420	433	461	463	464	441	N.A.
Eggs (billion)	34.0	35.8	45.1	47.9	51.2	55.5	57.7	46.7	51.5	58-61

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a. Agricultural output for sales and home consumption minus farm products used for seed and livestock feed. Price weights for 1970 have been used in aggregating the physical output of crops and animal products (including changes in inventories of livestock).
b. Value of food and technical crops less seed but including the portion fed to livestock.
c. Value of output of meat, milk, eggs, wool, and other livestock products less livestock feed and adjusted for changes in herd inventories.
d. Plan for growth of gross volume of agricultural output.
e. Calculated using the implied average annual rate of growth derived from production data in the base year and planned output in terminal years.

SOURCES: Production statistics for 1966-1974 from Narodnoye khozyaystvo SSSR v .... godu, selected years. Data for 1975 are from preliminary press reports. Plan data for 1966-1970 are from Pravda, April 6, 1966, page 4, for 1971-1975 from Gosudarstvennyy pyatiletniy plan razvitiya narodnogo khozyaystva SSSR na 1971-1975 gody, page 167,169-70, and for 1976-1980 from Pravda, March 7, 1976, pages 2-8.

Soviet officials tend tc blame the weather for agricultural shortfalls, while timely organization and good management are given credit for successful crops. Paradoxically, however, weather during 1970-74 was generally good and relatively stable. Average cumulative precipitation for October through July during this time was higher than any five-year period since 1960 (see Table 3). Periods of good weather and economic planning periods do not always coincide, unfortunately. Average annual precipitation for 1971-75 was about the same as for 1966-70. Table 3 also shows that no single weather variable explains yield. The temporal and spatial distribution of rain is difficult to measure, and short-lived weather phenomena, such as the hot, dry winds known as sukhovey, often do not appear in weather statistics but can have a marked effect on crop yield. For example, cumulative precipitation in 1973 was 11 percent less than in 1970, but yield was 13 percent greater. Precipitation was higher in 1974 than in 1973 but a late season sukhovey, which could not be detected on monthly weather summaries, cut yields. Nevertheless, precipitation is a rough measure of yields. In 1975, rainfall was similar to 1962 and 1965, as was yield.

Production of grain, the USSR's most important crop, fluctuated widely during 1971-75. Plans for an average

TABLE 3

USSR: INDEXES OF PRECIPITATION, OCTOBER THROUGH JULY, AND GRAIN YIELD, 1961-75

Year	Index of Total Precipitation, October-July a/ (Average 1966-70 = 100)	Index of Grain Yield b/ (Average 1966-70 = 100)
1961	83	78
1962	75	79
1963	67	60
1964	102	83
1965	82	69
Average, 1961-1965	82	74
1966	100	100
1967	91	88
1968	96	102
1969	94	96
1970	119	114
Averages, 1966-70	100	100
1971	106	112
1972	95	102
1973	106	128
1974	110	112
1975	78	79
Average, 1971-1975	99	107
Average, 1970-1974	107	114

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a. Precipitation in millimeters -- available through the World Meteorological Organization reporting system -- weighted by the distribution of the area sown to grain in 1973.
b. Index of yields of all grain in centners per hectare from Narodnoye khozyaystvo SSSR v .... godu , selected years.

harvest of 195 million tons were unrealized. The actual average crop was 181.5 million tons, with the plan for individual years met only once -- by the record crop in 1973. The variance in the size of the grain crop, as measured by the deviation from a long-term trend line, far exceeded the variance in production during the Seventh and Eighth Five-Year Plan periods.

More important than the unfulfilled plans and the variations in production, the USSR was twice caught between a poor harvest and the livestock program's growing demand for feed. Following the bad 1972 harvest, purchases of 23 million tons of grain from the West, worth approximately $1.5 billion, were enough to forestall distress slaughtering and tide the program over (see Table 4). The more serious shortfall in 1975, however, resulted in purchases of 25 1/2 million tons during fiscal year 1976, which cost about $3.7 billion. * These imports, even with a number of conservation measures, were not enough to support livestock inventories.

Plans for other crops were also generally unfulfilled (see Table 5). Cotton, which is primarily grown on irrigated

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* For delivery during fiscal year 1976. Another 2.2 million tons were bought for delivery between June and October 1976, while further purchases were made for delivery after October.

TABLE 4

USSR: EXPORTS AND IMPORTS OF GRAIN a/

Thousand metric tons

Fiscal Year b/	Exports	Imports c/	Net Imports
1970	7687	2178	-5509
1971	8296	3509	-4787
1972	7252	7841	589
1973	5331	22900	17659
1974	6987	10960	3973
1975	4134	5582	1448
1976 d/	0	25528	25528

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a. Includes grain equivalent of flour, converted using a 72 percent extraction rate, and groats.
b. Data are for fiscal years ending June 30 of the stated year. Data for fiscal years 1970-71 are an average of two calendar years.
c. Including purchases on Soviet account for shipment to East European countries and other client states.
d. Estimates.
SOURCES: Vneshnyaya torgovlya za .... god, selected years and press accounts of grain trade.

TABLE 5

USSR: PLANNED AND ACTUAL OUTPUT DURING THE NINTH FIVE-YEAR PLAN PERIOD

Million metric tons

	Average Annual 1971-75 a/	1971 a/	1972 b/	1973 c/	1974 d/	1975 e/
			(* indicates plan fulfillment)			
Grain, Plan	195.0	189.5	192.2	197.4	205.6	215.7
Actual	181.5	181.2	168.2	222.5*	195.7	140.0
Potatoes, Plan	106.0	99.8	102.8	105.0	107.9	109.8
Actual	89.7	92.7	78.3	108.2*	81.0	88.5
Sugar beets, Plan	87.0	81.5	84.2	87.4	91.3	94.0
Actual	75.9	72.2	76.4	87.0	77.9	66.2
Vegetables, Plan	24.7	22.3	23.4	24.5	26.1	27.4
Actual	22.7	20.8	19.9	25.9*	24.8	22.3
Cotton, Plan	6.8	6.3	6.5	6.8	7.3	7.7
Actual	7.7*	7.1*	7.3*	7.7*	8.4*	7.9*
Sunflower seeds, Plan	6.8	6.4	6.6	6.8	7.1	7.4
Actual	6.0	5.7	5.0	7.4*	6.8	5.0
Meat, Plan	14.3	12.9	13.6	12.9	14.4	15.3
Actual	14.0	13.3*	13.6*	13.5*	14.6*	15.2
Milk, Plan	92.3	85.6	89.0	86.2	90.8	94.8
Actual	87.5	83.2	83.2	88.3*	91.8*	90.8
Eggs, Plan (billion)	46.7	42.6	44.6	47.5	53.5	55.8
Actual (billion)	51.5*	45.1*	47.9*	51.2*	55.5*	57.7*
Wool, Plan (TMT)	464	433	448	434	460	472
Actual (TMT)	441	429	420	433	461*	463

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a. Original Ninth Five-Year Plan given or derived from data in Gosudarstvennyy pyatiletniy plan razvitiya narodnogo khozyaystvo SSSR na 1971-1975 gody, pages 167 and 169-70.
b. Output plans for 1971 and 1972 are derived from actual 1970 production and planed average output for 1971-75. For sugar beets, cotton and sunflower seed, planned output for 1975 was available.
c. Gusev, N.,"Sel'skoye khozyaystvo v reshayushchem gody pyatiletki," Ekonomika sel'skogo khozyaystva, No. 2, 1973, page 8.
d. Gusev, N., "Sel'skoye khozyaystvo v opredelyayushchem gody pyatiletki," Ekonomika sel'skogo khozyaystva, No. 2, 1974, page 3.
e. Gusev, N., "Plan zavershayushchego goda pyatiletki," Ekonomika sel'skogo khozyaystva, No. 2, 1975, page 5.
SOURCES: Production statistics from Narodnoye khozyaystvo SSSR v ..... godu, selected years. Other sources given above.

land, was the notable exception. Production of cotton reached a new high each year until 1975, when output fell slightly but remained above plan. Only in the record year 1973 did production of other crops exceed planned levels.

The record for the livestock sector is somewhat better, in large part due to the massive grain imports. The value of livestock inventories grew at an average annual rate of 1.2 percent during 1971-75. Cattle inventories in the socialized sector grew steadily while in both private and socialized sectors the number of hogs -- heavy grain consumers -- dropped in 1972 and 1975 as feed supplies became scarce. Meat production goals, which were reduced following the harvest problems in 1972, were met every year except 1975, when the target was missed by only 100,000 tons. Had premature marketing of lighter-than-normal animals not been necessary during the fall of 1975, this goal would also undoubtedly have been made. Egg production exceeded planned levels throughout the period, while milk and wool targets were reached in 1973-74 and 1974, respectively.

B. The 1975 Crop Shortfall and Its Effects

The 1975 crop failure was the worst during the Brezhnev period, jeopardizing the much touted program to improve consumers' diets. Production of all major crops, suffered

from the severe drought. The 140 million ton grain crop was roughly 50 million tons below the average for 1971-74 and the worst in the postwar period when measured as a deviation from the long-term trend. Output of other major crops such as sugar beets and sunflower seeds -- an important source of vegetable oil -- was also below 1974 levels. Further, the drought dried up pastures and reduced supplies of forage crops, compounding the shortage of feedgrains.

Grain production was less than two-thirds of needs, hitting the livestock sector the hardest. The regime did everything it could to maintain herds, using such stopgap measures as shipping animals from drought to non-drought areas and feeding reeds, leaves, and other low-grade feed stuffs to starving livestock. In addition, normal grain exports were apparently cancelled. Finally, the USSR contracted for about 28 million tons of foreign grain for delivery by October 1976. In this connection, the Soviets for the first time committed themselves to a long-term grain import agreement with the United States for the purchase of

6 to 8 million tons per year for the five years beginning October, 1976.*

Despite these measures feed suplies were inadequate. As a result, state and collective farms began distress slaughtering of hogs and poultry by late summer. Private farmers, who provide about one-third of the country's meat and own over two-fifths of the hogs and cattle and about half of the poultry, followed suit. Consequently, inventories of hogs and poultry dropped 20 percent and 15 percent respectively during 1975. Sheep and cattle were relatively unaffected (see Table 6). Despite the sharp decrease in the number of animals during the fourth quarter of 1975, meat output did not increase noticeably. Part of the reduction in livestock numbers reflected decisions to reduce farrowing and hatching rates, while the prematurely killed animals were underweight.

In general, the consumer was unaffected during 1975 by agriculture's problems. An inventory of processed foods, coupled with the usual lag between a crop shortfall and a downturn in livestock production, kept enough food in the

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* Under the terms of the agreement exceptions can be made. The US may sell less than 6 million tons if it declares a shortage. It may sell more than 8 million tons if the USSR need is exceptional and US supplies permit.

TABLE 6

USSR: LIVESTOCK INVENTORIES

Million head, end of year

	Average annual, 1966-70	1971	1972	1973	1974	1975
Index of total livestock inventories (1970=100) a/	94.7	103.6	103.4	106.4	109.5	105.9
Number of livestock						
All sectors of the economy						
Cattle	96.9	102.4	104.0	106.3	109.1	111.0
Hogs	56.3	71.4	66.6	70.0	72.3	57.8
Sheep and goats	142.1	145.3	144.7	148.5	151.1	146.9
Poultry	566.9	652.7	686.5	700.0	747.7	674.0 (est.)
Socialized sector						
Cattle	69.9	77.5	79.3	81.7	84.6	87.6
Hogs	41.6	55.6	53.3	56.4	58.6	45.6
Sheep and goats	108.9	112.6	112.4	116.4	119.2	117.7
Private sector						
Cattle	27.0	24.9	24.7	24.6	24.5	23.4
Hogs	14.7	15.8	13.3	13.6	13.7	12.2
Sheep and goats	33.2	32.7	32.3	32.1	32.0	29.2

a. Index of end-of-year inventories for cattle, hogs, sheep, goats, and poultry weighted by relative liveweight prices in 1970.

SOURCES: Narodnoye khozyaystvo SSSR v ..... godu, selected years and SSSR v tsifrakh v 1975 godu.

marketing pipeline. For the year as a whole, per capita food consumption increased 1 1/2 percent and meat consumption was up 1 percent, reaching a record level. Meat prices rose in the free markets, but this was due not to shortages but rather to higher incomes and greater demand. *

Because agriculture accounts for roughly one-fifth of Soviet gross national product, growth in GNP slumped to about 2 1/2 percent in 1975, down from 4 percent in 1974 and an average annual rate of 4 1/2 percent in 1971-73. Other sectors of the economy were not visibly affected by agriculture's problems in 1975. Industrial output in particular equaled the average annual rate achieved for the 1971-74 period. The rate of growth in the other principal sectors either maintained the same pace (services and transportation) or fell moderately (construction). The delivery of $2.8 billion worth of grain, however, combined with a rapid rise in most categories of imports and very little export growth to push the Soviet hard-currency deficit in 1975 to about $6 1/2 billion.

The main impact of the 1975 crop failure is being felt

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* In addition to the state-run retail network, some food products are sold in collective farm markets where farmers sell excess produce from their private plots and where prices fluctuate according to supply and demand.

this year. The consumer has been hardest hit, but growth of industrial production and GNP also are being slowed, and the Soviets continue to carry a large hard-currency trade deficit. Moreover, the USSR's agricultural situation remains precarious with carry-over stocks of grain depleted, livestock herds reduced, remaining livestock underfed, and output goals dependent on above-average weather.

Probably the most serious problem in 1976 is the expected drop in meat consumption. At the beginning of the year, domestic and imported feed supplies were not sufficient to support already reduced livestock inventories. Distress slaughtering continued during the spring, but because animals continued to be slaughtered at lighter-than-normal weights meat production dropped off. Meat production in government-operated packing plants during January through April was off 13 percent from a year earlier, with production in March and April down 22 percent from last year. Meat shortages were widely reported in the Western press.* As feed supplies improve during the summer and fall -- assuming normal weather and a reasonable crop

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* For example, see "A Meatless Day Begun in Moscow," New York Times, May 16, 1976, page 6, "Soviet Fish Days," The Washington Post, May 16, 1976, page A17, and "Soviets Quietly Cut Meat Content in Sausages," Ibid., June 8, 1976, page A11.

outlook -- efforts to rebuild the average weight of animals in order to support breeding and get the livestock program back on track may keep meat production at depressed levels.

Per capita meat consumption in 1976 may drop as much as one-quarter. This would return the consumer to the level of the late 1960s. Although per capita consumption of meat has increased 21 percent since 1970, and 48 percent since 1960, the average Soviet citizen still eats only two-fifths as much meat as his US counterpart and three-fourths as much as the average Pole or Hungarian.

In addition, an expected downturn in egg and milk production from 1975 levels, albeit less severe, will further erode the quality of the Soviet diet. This decrease in availability of livestock products will temporarily reverse the steady decline in the share of starchy staples in the average Soviet diet. Bread and potatoes currently account for about one-half of the calories consumed.

Agriculture is expected to slow GNP growth again in 1976. Even if favorable weather provides a substantial expansion in crop production, the roughly 8 1/2 percent rebound in farm output for 1976 projected in the Five Year Plan appears optimistic. Despite the improvement in feed supplies that such weather would bring, production of meat will drop in 1976 and cannot expand substantially until

livestock herds are build up again. This takes time -- a year or so for pigs, but several years for cattle.

C. Agricultural Inputs

The farm sector's problems in 1971-75 were not the result of a reduced commitment to agriculture. Resource flows to agriculture grew steadily and were not cut back after bumper harvests. Ambitious plans for agricultural investment and for the delivery of machinery and materials to the farms were, with only minor exceptions, met.

New fixed investment during the last five years grew at an average annual rate of over 9 1/2 percent, faster than the rate achieved in 1966-70 and planned for 1971-75. Moreover, investment in agriculture grew almost two-thirds faster than investment in the remaining sectors of the economy. As a result, agriculture's share of investment for the five-year period as a whole amounted to about 26 percent. *

In addition to direct investment, farms benefit from investment in other branches of the economy. When

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* Includes productive investment, such as the purchase of agricultural machinery, as well as investment for non-productive purposes such as housing. Alone, productive investment in agriculture amounts to about 20 percent of the economy's total investment. In the US, productive investment in agriculture is less than 5 percent of total investment.

agriculture is defined in its broadest terms to include additions to production capacities in branches supporting agricultural development, "agricultural investment" grew at an annual average rate of 10 1/2 percent during the Ninth Five-Year Plan period and absorbed slightly more than 34 percent of the economy's investment funds.*

Support of agriculture from industry also generally met planned levels. Deliveries of trucks and agricultural machinery grew steadily, meeting or slightly exceeding the plan (see Table 7). The number of tractors and combines

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* Since the beginning of the Ninth Five-Year Plan, annual plans and plan fulfillment reports have presented a concept of gross fixed investment in agriculture that includes (1) investment for such items as construction and equipping of livestock shelters, irrigation and drainage construction, electrification, expenditures for tractors, transport means, agricultural machinery and equipment; (2) investment for construction of housing, schools, clubs, hospitals; and also (3) expenditures for construction of repair enterprises, for agricultural scientific-research institutions, for development of various construction enterprises, and other expenditures entering into the complex of expenditures for the development of agriculture.

A second and larger concept of gross fixed investment in agriculture has also emerged, that is, gross fixed investment in agriculture and branches supporting its development. This concept includes gross fixed investment as defined above and also (1) gross fixed investment in additions to production capacities in branches supporting agricultural development (for the most part industrial branches) and (2) gross fixed investment in housing constuction in rural areas financed with funds of collective farm members and wage and salary workers. While some data regarding these expenditures are available for the 1976 Plan, no data are available for the 1976-80 Plan as a whole.

TABLE 7

USSR: DELIVERIES OF MACHINERY AND EQUIPMENT TO AGRICULTURE, PLANNED AND ACTUAL

	Average Annual 1966-70 Plan	Average Annual 1966-70 Actual	1971	1972	1973	1974	1975	Average Annual 1971-75 Plan	Average Annual 1971-75 Actual	Average Annual 1976-80 Plan
Deliveries to agriculture of:										
Tractors,										
Thousand units	358	293	313	313	323	348	370	340	333	380
Rate of growth a/	13.7a/	5.2	1.3	-0.1	3.3	7.7	6.4	3.2b/	3.7	0.9b/
Trucks,										
Thousand units	220	143	169	187	224	250	269	220	220	270
Rate of growth a/	29.7b/	10.7	8.2	10.4	19.9	11.6	7.5	11.6b/	11.4	0.1b/
Agricultural machinery										
Billion rubles	2.2	1.8	2.5	2.7	3.1	3.5	3.8	3.1	3.1	4.6
Rate of growth a/	11.3	6.6	16.0	11.4	13.1	11.9	8.9	12.9b/	12.2	6.6b/
of which, combines;										
Thousand units	110	94	99	93	82	83	92	109	90	108
Rate of growth	11.1b/	4.1	2.0	-6.3	-12.2	2.3	10.3	3.8b	-1.1	5.3

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a. Rates of rowth computed from unrounded data.
b. Constant rates of growth derived from actual deliveries in the base year and planned deliveries for the succeeding five-year period.

SOURCES: Narodnoye khozyaystvo SSSR v .... gody, selected years, SSSR v tsifrakh v 1975 gody, and yearly plan fulfillment reports.

sent to the farms narrowly missed planned goals, but shipment of newer, greater horsepower machines upgraded existing parks. Efforts to improve cropland also continued. Deliveries of fertilizer averaged a little more than 61 million tons per year and reached 75.4 million tons in 1975, 400,000 tons above plan (see Table 8). Lime, needed to neutralize acid soil and to maximize the beneficial effects of fertilizer, was applied to an average of 6 million hectares a year, 1 1/2 million hectares above the yearly average for 1966-70. The gross addition of irrigated land far exceeded plans while the area drained was somewhat short of the target.

Although total deliveries of machinery and gross addition of irrigated and drained land are impressive and reflect agriculture's high priority for investment funds, they can be somewhat misleading. Retirement rates are high, and stocks, whether tractor parks or area under irrigation, grow more slowly. For example, although approximately 1.7 million tractors and 449,000 combines were delivered to agriculture during 1971-75, parks grew by only 422,000 and 67,000, respectively. Retirement rates of improved land are even higher, averaging roughly one-quarter of gross additions.

TABLE 8

USSR: EFFORTS TO IMPROVE CROPLAND, PLANNED AND ACTUAL

	Average Annual 1966-70 Plan	Average Annual 1966-70 Actual	1971	1972	1973	1974	1975	Average Annual 1971-75 Plan	Average Annual 1971-75 Actual	Average Annual 1976-80 Plan
Mineral fertilizer, deliveries to agriculture:										
Million tons, standard units	41.4	37.0	50.5	54.8	60.0	65.9	75.4	61.4	61.3	93.4
Percent increase	15.2	11.0	10.7	8.4	9.5	9.8	14.5	10.4	10.6	9.7
Area limed:										
Million hectares	6.0	4.5	5.2	5.5	5.9 (est)	6.4 (est)	7.0 (est)	N.A.	6.0	8.0-10.0
Percent increase	25.5	11.7	3.3	6.4	8.3	8.3	8.3	--	7.0	4.5-12.1
Gross addition of irrigated land:										
Thousand hectares	550	360	515	784	960	1090	985	640	867	800
Percent increase	11.3	-0.4	33.4	52.2	22.4	13.5	-9.6	17.4	21.0	-6.9
Gross addition of drained land:										
Thousand hectares	1250	782	834	837	905	815	1017	1000	882	940
Percent increase	19.6	2.9	2.3	0.4	8.1	-10.0	24.8	6.9	4.5	-2.6

SOURCES: Narodnoye khozyaystvo SSSR v ..... gody, selected years, SSSR v tsifrakh v 1975 godu, and yearly plan fulfillment reports.

IV. The Tenth Five-Year Plan

The Tenth Five-Year Plan has already been tarnished by the 1975 crop disaster. In contrast to the last five-year plan, which followed a series of relatively successful years, the present plan is beginning with shattered momentum in the agricultural sector, depleted reserves, a population unhappy about food shortages, and an economy that is vulnerable to further setbacks. Basic agricultural policy has not been changed, however. Indeed, few options are available to the leadership.

Output plans for the Tenth Five-Year Plan are generally consistent with or above long-term trends. The targets for livestock products have been cut back in response to last year's harvest disaster but remain tied to an ambitious herd rebuilding program. On the other hand, the planned growth in the flow of resources to agriculture, although in keeping with the investment program for the rest of the economy, has been sharply reduced from the last Five-Year Plan. Deliveries of fertilizer will continue to grow at an average annual rate of about 10 percent, but little expansion in land melioration efforts is planned, and deliveries of equipment will grow only slightly. Major increases in

productivity must therefore be realized and weather conditions must be above-average if the agricultural targets are to be met.

A. Output

The gross value of output of agricultural production is to increase at an average annual rate of about 5 1/2 percent in 1976-80. This rate exceeds the growth planned for 1966-70 and 1971-75. At first glance this increase appears only moderately ambitious, based as it is on the bad showing in 1975. Success, however, will depend largely on the size of the grain crop.

Grain production during 1976-80 is to average 215 to 220 million tons yearly (see Table 9). Grain production in 1976 is planned at 205-210 million tons.* If the 1976 plan is met, production in 1977-80 would have to appear somewhat as follows, assuming a constant average annual rate of growth, if the 1976-80 plan is to be fulfilled.

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* Planned grain production in 1976 was given as "14 percent higher than average annual production in the Ninth Five-Year Plan", 181.5 million tons.

	Grain Production (million metric tons)
1976	207
1977	212
1978	217
1979	223
1980	228
Average, 1977-80	220

The overall grain production plan coincides perfectly with the 1950-74 trend line but appears optimistic. When the 1975 harvest is included in the trend calculation, average grain production for 1976-80 drops to 205 million tons. Such a projection, of course, assumes normal weather but the frequency of weather-related crop shortfalls in the past -- notably 1963, 1965, 1972, and 1975 -- suggest that one or perhaps two of the next five years will be unfavorable, making fulfillment of the grain production plan unlikely.

More intensive fertilizer applications are to account for the bulk of this increased grain production -- about 55 percent. In addition, there is to be some restructuring and expansion of the grain area. Higher- yielding grains such as

TABLE 9

USSR: AVERAGE ANNUAL OUTPUT OF MAJOR CROPS AND ANIMAL PRODUCTS, 1966-70 PLAN AND ACTUAL, 1971-75 PLAN AND ACTUAL, AND 1976-80 PLAN

Million Metric Tons

	Average Annual, 1966-1970			Average Annual, 1971-1975			Average Annual, 1976-1980	
	Plan	Increase over average for preceeding five years (percent)	Actual	Plan	Increase over average for preceeding five years (percent)	Actual	Plan	Increase over average for preceeding five years (percent)
Grain	167.0	28.2	167.6	195.0	16.4	181.5	217.5d/	19.8
Potatoes	100.0	22.6	94.8	106.0	11.8	89.7	N.A.	--
Sugar beets	80.0	35.1	81.1	87.0b/	7.3	75.9	96.5d/	27.1
Cotton	5.8a/	16.2	6.1	6.8c/	10.7	7.7	8.5b/	10.4
Meat	11.0	18.3	11.6	14.3	23.3	14.0	15.3d/	9.3
Milk	78.0	20.6	80.6	92.3	14.5	87.5	95.0d/	8.6
Eggs (billion)	34.0	18.5	35.8	46.7	35.5	51.5	59.5d/	15.5

a. Midpoint of planned range of average annual production of 5.6 to 6.0 million tons.
b. Calculated using the implied average annual rate of growth derived from production data in the base year and planned output in the terminal year.
c. Rounded from planned average annual production of 6.75 million tons.
d. Midpoint of planned range of average annual production of 215 to 220 million tons for grain, 95 to 98 million tons for sugar beets, 15.0 to 15.6 million tons for meat, 94 to 96 million tons for milk and 58 to 61 billion eggs.

SOURCES: Production statistics for 1966-74 are from Narodnoye khozyaystvo SSSR v .... godu, selected years. Data for 1975 are from SSSR v tsifrakh v 1975 godu. Plan data for 1966-70 are from Pravda, April 6, 1966, page 4, for 1971-75 from Gosudarstvennyy pyatiletniy plan razvitiya narodnogo khozyaystva SSSR na 1971-1975 gody, page 167, 169-70, and for 1976-80 from Pravda, March 7, 1976, pages 2-8.

winter wheat, winter rye, spring barley, and corn are to be emphasized. The area under pulses is also to expand. Land reclamation and the use of fertilizer on pastures and other fodder crops is to increase yields of these crops to the extent that some of this pastureland can be switched to grain. Double cropping on irrigated land and the expanded use of irrigated land for grain are also to boost production. In addition, improvement of the soil will support the program. By Soviet account about 12 million tons of grain are foregone each year due to inadequate liming. Moreover, the availability of higher-quality machinery is to improve the timliness of sowing and harvesting operations, allowing the harvest of another 6 million tons of grain yearly. *

Data on plans for other crops are scanty. Production of cotton is to reach 9 million tons by 1980, a plan that will undoubtedly be overfulfilled. Output of sugar beets is to average 95 to 98 million tons for the five years, consistent with projections based on a long-term trend. Plans for other crops -- including potatoes, an important food and feed crop -- have not yet been released.

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* Stepanov, A.I.,"Grain Economy Must be Developed Thoroughly," Zernovoye khozyzystvo, Number 3, 1976, pp.18-19, and Ibid., pp. 2-3.

Output targets for livestock products were apparently reduced in the wake of the distress livestock slaughtering stemming from last year's poor crop. Average production of meat (15-15.6 million tons), milk (94-96 million tons), and eggs (58-61 billion eggs) are only slightly above the levels achieved in 1975. Even so, the reduced plans are ambitious. For example, the 1975 setback in the livestock program probably will not allow meat production in 1976 to exceed 12 million tons. Fulfillment of the plan would then require a staggering 12 percent average annual increase in meat output during the remainder of the Five-Year Plan period. If grain production falters, the Soviets will be forced to rely on continuing substantial imports of grain to meet the plan for livestock products.

B. Investment Goals

Agriculture will maintain its priority among resource claimants during the next five years. As shown below, more than one-fourth of new fixed investment in 1976-80 will go to agriculture, as it did during the past two plan periods.

	Agriculture's Share of New Fixed Investment (percent)
1961-65	19.6
1966-70	23.2
1971-75,Plan	25.7
1971-75	26.2
1876-90,Plan	26.9

Yearly growth in the amount of funds channeled to agriculture will be cut substantially, however. Investment is to grow at an average annual rate of only 3 1/2 percent, a sharp reduction from the 9 1/2 percent recorded during 1971-75. The slowdown seems to be largely a reflection of a general tightening of investment funds throughout the economy rather than a reaction to either the good or bad harvest of the past five years. Investment in sectors other than agriculture is scheduled to grow at a yearly rate of about 4 percent.

On the whole, investment plans for 1976-80 are somewhat puzzling. Deliveries of mineral fertilizer will continue to grow at high average annual rates and the area limed will increase yearly. Average annual gross additions to irrigated and drained cropland, however, will be somewhat below the 1975 level. Growth in deliveries of tractors,

trucks, and agricultural machinery will slow appreciably. These plans are consistent with the overall design for the economy, that is an increase in productivity is to be the prime source of growth. Considering the planned increases in output, however, the investment strategy would seem to stress efficiency and productivity gains not warranted by agriculture's record.

Fertilizer deliveries are the only inputs scheduled to continue to increase at past rates. Deliveries to agriculture are to grow at an average annual rate of almost 10 percent, compared with the 10 1/2 percent yearly rate planned and achieved in 1971-75. By 1980, 120 million tons of fertilizer, including five million tons of feed additives, will be sent to the farms, three-fifths more than the amount delivered last year. Increased application of fertilizer is to account for over one-half of the planned rise in grain production. Until recently, fertilizer application schedules have favored technical crops and potatoes. Applications to grain are increasing, however. In 1975 the amount of fertilizer applied to grain was ten times the level in 1960. Applications to grain are to increase another 75 percent by 1980 and are to be directed to those areas with adequate moisture -- such as the Non-Black Soil Zone -- where response rates are the

greatest.

Much of the fertilizer earmarked for agriculture in 1976-80 will not be available until late in the period. The capacity to produce the 120 million tons for 1980 delivery won't be available until 1978 or 1979. Given the deliveries planed for 1976 and 1980, as well as the total amount scheduled for delivery in 1976-80, it appears that deliveries will grow by about 4 or 5 percent yearly through 1978 and then shoot upward in 1979 and 1980. If this schedule holds, almost half of fertilizer delivered to agriculture in 1976-80 will be received during the last two years. The affect on grain yields will therefore not be steady. Moreover, planned applications to grain will be difficult to meet unless losses in transportation and storage -- currently some 10 to 15 percent -- are reduced.

Efforts to improve the quality of cropland will also be continued. The area limed is to average 8 to 10 million hectares yearly, against the 6 million hectares averaged during 1971-75. Application of lime will be a key ingredient in the program to raise productivity in areas such as the Non-Black Soil Zone of European Russia. Although the average gross addition to irrigated and drained land will be smaller, this slowdown could be countered by a reduction in the area of improved land "retired" each year.

Scheduled shipments of tractors, trucks, and agricultural machinery, will also grow at sharply reduced rates. Deliveries of tractors are scheduled to grow about one percent yearly, while the average yearly number of trucks received will approximate the 1970 level. Agricultural machinery delivered will increase about 6 1/2 percent yearly, but this is only one-half the rate for 1971-75. Delivery of combines, a major component of agricultural machinery, are to grow at an average annual rate of about 5 1/2 percent, following below-plan performance in 1971-75.

The slowdown in the delivery of equipment, especially tractors, in part reflects the fact that the industry is approaching its output capacity. In order to increase substantially the deliveries of agricultural machinery a complex changeover to a second shift or addition of new production capacity would be required. Given lags in construction and commissioning of new capacity -- as well as the competition from similar projects such as the Kama truck plant and the Baikal-Amur mainline railroad for funds to buy capital equipment -- building would have had to start years ago in order to bring this capacity on line during 1976-80. No program was started.

As in the case of other inputs, the slowdown in

machinery deliveries may well be offset by other factors. The retirement rate for tractors dropped sharply in 1975. Lower retirement rates would allow faster-than-normal expansion of parks despite the slower growth in deliveries. Also the trend to larger tractors with greater horsepower and the recent introduction of new combine models will allow parks to be qualitatively improved. Improvement in the mix of associated farm equipment, would further increase the productive capacity of existing parks, but the failure to produce complementary agricultural machinery for higher horsepower tractors has been one of the constant complaints of the last decade.

The regime may decide to make some short-run adjustments in its investment strategy. Some republic leaders have questioned the planned pattern of investment for farms, specifically the wisdom of continuing to build large-scale livestock complexes without first ensuring an adequate feed base. In addition, some middle-level planners, who in 1975 wrote bullish articles about farm achievements during the past decade, now stress agriculture's need for help from other sectors. The adjustments that could be made during the next five years, however, are few. Currently planned investment is largely designed to save labor. A transfer of resources, for

example from construction of automated livestock feeders to production of traditional agricultural machinery, would emphasize increased output, but as discussed earlier, the agricultural machinery industry is facing capacity limitations. The alternatives may therefore be reduced to stimulation of the private sector and taking pains that the planned gains from improvements in the Non-Black Soil Zone are realized.

C. The Private Sector

By encouraging agriculture's private sector, the regime could boost the availability of selected food products without directly investing in their production. About one-quarter of total agricultural output, including one-fifth of the crops -- mostly potatoes, fruits, and vegetables -- as well as one-third of the livestock products, comes from private producers. Such high-quality products are in especially short supply this year.

Although the state does not invest directly in the private sector, private activity does have some cost. Private agricultural production is almost exclusively made up of small holdings of land, up to one-half hectare, frequently combined with one or two head of livestock and a small flock of poultry. Private farmers also have access to additional areas for pasturing of livestock and resources --

including labor, young livestock, feed and other materials -- are siphoned, legally or illegally, from the farms to the private plots.

The long-run policy toward this sector has been constrictive, but restrictions have been temporarily relaxed after bad harvests. In the past, output in the private sector has been easily spurred by supplying more livestock and feed to individuals, reducing taxes, lowering barriers to the use of public lands, and allowing some urban residents to own livestock. The current leadership is familiar with this process; when farm production stagnated in 1965, the Brezhnev regime immediately turned to the private sector. Private livestock holdings rose 13 1/2 percent in that year, and by 1966, total acreage and livestock holdings in the private sector were up 7 1/2 percent and 15 percent, respectively, from 1964 levels, while output increased 7 percent.

The regime is already encouraging agriculture's private sector to produce more. Although there was no reference to private agriculture in the speeches given at the Twenty-Fifth Party Congress in February, 1976, the draft directions of the five-year plan noted that farms are "to render rural dwellers necessary assistance in conducting

private subsidiary activities. " (1) At least one advocate has gone further and discussed the need to both coordinate production in the private and public sectors and to introduce modern equipment and technology into the private plots.(2)

D. The Non-Black Soil Zone Program *

Increased attention is being devoted to development of the Non-Black Soil Zone of the Russian republic. This attention may be well founded. Success in developing this area will further efforts not only to raise production but also to stabilize farm output. To this end the USSR plans to invest heavily in land melioration, delivery of fertilizer, farm equipment, and construction of the rural infrastructure during the next five-years.

The non-black soil zone is already an important producer of agricultural products and was targeted for some attention in Brezhnev's programs of 1965 and 1970 (see Table

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(1) Pravda March 7,1976, page 6.
(2) Shmelev, G.I., "The Private Subsidiary Farm as a Sphere of Public Interest Under Socialism," Izvestiya akademii nauk SSSR: seriya ekonomicheskaya, Number 6, 1975, pp. 85-94, and Izvestiya, January 24, 1976, page 2.
* The Non-Black Soil Zone of the Russian Republic includes 29 oblasts, an area of about 52 million hectares. In 1975 this zone produced 13 percent of the USSR's grain, 35 percent of its potatoes, 19 ppercent of its vegetables, 16 percent of its meat, and 21 percent of its milk.

10). This zone includes large tracts of boggy, uneven, and stony land with soils low in natural fertility. Moderate amounts of money were spent, mainly for draining, clearing, leveling, liming, and fertilizing. Although there is a relatively short growing season, the zone has the highest average annual rainfall of any large agricultural area in the European USSR.

Although some resources were earmarked for this area in the past, the zone will receive an increased share of all types of inputs in 1976-80. Gross fixed investment is to total 35 billion rubles with another 8 billion rubles used to develop other branches that are closely connected with agriculture. Fertilizer deliveries during the period will be double the amount used in 1971-75, a total of 120 million tons. Delivery of all types of equipment will grow faster in this area than in the rest of the country. About 1.8 million hectares of drained land will be put into operation. As a result, grain production is scheduled to increase from 18.8 million tons in 1975 to 31 million tons in 1980. Other crops are to respond likewise and production of livestock products -- including large-scale livestock complexes -- is to increase.

E. Outlook

How well the USSR's economy performs during the course

TABLE 1C

USSR: INVESTMENT IN THE NON-BLACK SOIL ZONE (NBSZ) OF THE RSFSR

	1971-75		1976-80 Plan	
	USSR	NBSZ	USSR	NBSZ
Total gross fixed investment in agriculture:				
Billion rubles	131.5	19.5	171.7	35.0
Percent share	100.0	14.8	100.0	20.4
Deliveries of:				
Tractors				
Thousand units	1657	287	1900	380
Percent share	100.0	17.3	100.0	20.0
Trucks				
Thousand units	1086	190	1350	230
Percent share	100.0	17.4	100.0	17.0
Grain combines				
Thousand units	449	73	538	94
Percent share	100.0	16.2	100.0	17.5
Fertilizer				
Million tons	307	63	467	120
Percent share	100.0	20.5	100.0	25.7

of the Tenth Five-Year Plan depends in large part on the pattern and severity of weather-induced fluctuations in crop production, particularly grain. If average weather prevails over the next five years, most of the agricultural goals are in reach. Should the Soviets suffer another harvest disaster, its effect would depend on timing.

If weather conditions are beneficial during the 1976 growing season, the Soviets could harvest more grain than their minimum domestic requirements, estimated at roughly 175 million tons. * Under these conditions, the USSR could increase the weight of animals being marketed, begin the slow process of rebuilding livestock herds, and start to replenish carry-over grain stocks. If the harvest merely met minimum needs, expansion of herds would be postponed or depend on imported grain.

Another grain shortfall -- say 150 million tons -- in 1976, however, would be a major calamity and would foredoom the goals of the five-year plan. A failure at this time would force further large reductions in livestock numbers

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* Under normal conditions, grain requirements for food, industrial raw materials, seed, exports, and livestock feed would amount to some 200 million tons yearly. Because livestock feed accounts for roughly one-half of this requirement, the sharp reduction in herd size following the 1975 crop disaster has lowered the minimum grain requirement.

and additional massive imports of grain from hard-currency areas, worsening the large trade deficit anticipated in 1976. In turn, this might force the USSR to make substantial cutbacks in non-agricultural imports. The Soviet consumer would face another reduction in meat supplies, more than erasing the gains made under Brezhnev.

On the other hand, good crops in 1976 and 1977 might well be enough to generate sufficient momentum to survive a shortfall late in the plan period.

APPENDIX

MEASURING NET AGRICULTURAL PRODUCTION

The measure of agricultural production used in this paper is an approximation of the value of farm output available for sale or home consumption. It is based on the physical output of 41 crops and animal products weighted by average prices received by all producers (collective and state farms, other state agricultural enterprises, and individual producers) in 1970 for output sold through state procurement channels and the collective farm market and commission trade. This value of agricultural output is then adjusted for changes in inventories of our classes of livestock and deductions are made to account for the intra-agricultural uses of farm products such as feed and seed; that is, deductions are made for the amounts of grain, potatoes, sugar beets, and milk fed to livestock, for the quantity of eggs used for hatching, and for the amounts of grain and potatoes used as seed.

An index of the value of net agricultural output from 1960 through 1975 is given in Appendix Table 1 and broken into indexes for crop and livestock production in Appendix Table 2. Output of commodities included in the calculation,

minus seed but including the portion fed to livestock, is shown in Appendix Table 3, and the value of net agricultural production, as defined above, is derived in Appendix Table 4.

The physical commodities and livestock inventory series are for the most part official production statistics. Data for grain and sunflower seed production have been discounted to reflect waste and losses in handling. Procurement data are used for sugar beets. Estimates of output of individual types of vegetables are derived by using the relative shares of each type of vegetable in government purchases. Additional adjustments are made to some minor crops to compensate for the lack of data.

Estimates of the amount of grain and potatoes used as livestock feed are based on the availability of these crops after deductions for other uses (industrial use, food, net exports, and change in stocks). The quantity of sugar beets fed to livestock is assumed to be the difference between production and procurement. In estimating the appropriate deduction from the gross value of livestock for the value of grain and sugar beets fed, it is assumed that one-third of the product used as feed from a given crop is fed during the calendar year in which it was produced and that two-thirds are fed during the following calendar year. Estimates of

milk fed to livestock and amounts of grain and potatoes used as seed are based on official sources.

For a more comprehensive explanation of the methodology used in constructing this measure of net agricultural production see Douglas B. Diamond, "Trends in Output, Inputs, and Factor Productivity in Soviet Agriculture," U.S. Congress, Joint Economic Committee, New Directions in the Soviet Economy, Part II-B, U.S. Government Printing Office, Washington, D.C., 1966, and Douglas B. Diamond and Constance B. Krueger, "Recent Developments in Output and Productivity in Soviet Agriculture," U.S. Congress, Joint Economic Committee, Soviet Economic Prospects for the Seventies, U.S. Government Printing Office, Washington, D.C., 1973.

APPENDIX TABLE 1

USSR: Index of the Value of Net Agricultural Production, 1960-1975

Year	Index (1970=100)	Annual Rate of Growth (Percent)
1960	68.9	-0.5
1961	75.3	9.2
1962	73.2	-2.8
1963	62.9	-14.1
1964	75.7	20.4
1965	80.4	6.2
1966	86.4	7.4
1967	85.7	-0.8
1968	90.2	5.4
1969	88.1	-2.4
1970	100.0	13.6
1971	100.1	0.1
1972	93.6	-6.5
1973	107.6	14.9
1974	106.2	-1.3
1975	97.2	-8.4

APPENDIX TABLE 2

USSR: Indexes of Agricultural Production, 1960-1975 (1970=100)

Year	Net Agricultural Production	Crops a/	Livestock b/
1960	69	66	72
1961	75	72	78
1962	73	67	78
1963	63	62	63
1964	76	82	71
1965	80	76	84
1966	86	88	85
1967	86	89	83
1968	90	95	86
1969	88	87	89
1970	100	100	100
1971	100	99	101
1972	94	88	98
1973	108	114	102
1974	106	101	111
1975	97	89	104

a. Value of food and technical crops less seed but including the portion fed to livestock.
b. Value of output to meat, milk, eggs, wool, and other livestock products less livestock feed and adjusted for changes in herd inventories.

USSR: Production of Commodities Used in Net Agricultural Output, 1960-1975

Thousand Metric Tons

...PONENT	1970 PRICES (Rubles per ton)	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
HEAT	103.	34611.5	42349.6	40764.0	28076.6	43956.4	33986.0	66945.8	49136.8	59572.5	47693.5
YE	116.	7999.3	10322.5	9539.0	6154.6	6752.6	9553.3	7492.2	7695.6	8235.1	5787.3
UCKWHEAT	306.	331.7	536.6	448.1	243.9	425.0	605.3	590.4	797.1	1001.4	879.2
ICE	306.	115.8	182.7	187.3	297.9	323.6	420.5	522.9	670.9	771.3	793.6
ORN FOR GRAIN	138.	6354.1	13511.4	10807.5	8426.0	10028.7	5851.8	6114.2	6794.7	6285.0	8677.7
ATS	82.	6322.9	5149.3	3041.9	2254.0	3214.5	3784.0	6092.4	7816.7	7465.0	8439.2
ARLEY	91.	9388.0	8452.3	11914.0	12717.8	18169.9	12766.7	18865.6	16464.9	19064.4	21135.4
ILLET	91.	2279.9	2302.4	2033.4	1451.8	2643.2	1723.7	2439.1	2540.8	2025.9	2490.5
ULSES	113.	1241.3	2378.8	4232.9	4391.9	6317.9	3970.5	4388.1	4147.9	4578.8	4989.6
THER GRAIN	61.	191.1	214.4	30.7	110.7	110.2	133.8	52.7	59.5	-21.6	57.1
TOTAL GRAIN	103.	68834.6	85400.0	83028.8	64115.3	91942.0	72804.7	113493.5	96125.1	108977.8	100943.0
OTATOES	114.	67000.4	67400.0	53147.0	55694.0	77492.0	72313.2	71908.2	79635.1	86412.1	76389.0
EETS	108.	978.0	711.0	688.0	697.0	895.0	917.0	1018.0	1006.0	1046.0	1125.0
ABBAGE	95.	6613.0	6137.0	6140.0	5879.0	7125.0	6504.0	6054.0	7577.0	6369.0	6298.0
ARROTS	153.	878.0	872.0	863.0	692.0	1129.0	987.0	964.0	1047.0	1103.0	1331.0
UCUMBERS	212.	1956.0	1631.0	1487.0	1515.0	2219.0	1410.0	1750.0	2053.0	1787.0	1725.0
IONS	430.	1376.0	1421.0	1471.0	1000.0	1246.0	1639.0	1661.0	1417.0	1559.0	1575.0
OMATOES	168.	4044.0	4587.0	4429.0	4294.0	5587.0	5129.0	5143.0	6078.0	5893.0	5436.0
THER VEGETABLES	99.	829.0	792.0	911.0	984.0	1266.0	1041.0	1267.0	1356.0	1254.0	1255.0
TOTAL VEG	163.	16574.0	16151.0	15989.0	15051.0	19467.0	17627.0	17857.0	20534.0	19011.0	18745.0
UITS BERRIES NUTS	282.	4942.0	5050.0	5078.0	6411.0	6866.0	8100.0	7805.0	8966.0	10621.0	9467.0
GARBEETS	26.	52198.0	47742.0	43946.0	41455.0	76124.0	67500.0	69715.0	81579.0	84168.0	65283.0
TTON	555.	4289.0	4518.0	4304.0	5210.0	5285.0	5662.0	5981.0	5970.0	5945.0	5709.0
BACCO	2086.	112.0	103.0	100.0	102.0	122.0	184.0	169.0	178.0	215.0	215.0
KHORKA	582.	72.0	70.0	33.0	30.0	28.0	43.0	43.0	38.0	32.0	46.0
NFLOWER SEEDS	187.	3649.6	4372.8	4411.4	3942.2	5573.4	5013.1	5658.0	6079.4	6150.2	5849.4
YBEANS	260.	220.0	425.0	510.0	413.0	338.0	429.0	638.0	553.0	532.0	353.0
AX SEED	245.	65.0	80.0	90.0	90.0	90.0	85.0	100.0	100.0	100.0	90.0
STARD SEED	250.	20.0	31.0	80.0	77.0	102.0	80.0	100.0	90.0	75.0	70.0
STOR BEANS	800.	15.0	45.0	55.0	55.0	45.0	20.0	45.0	90.0	106.0	60.0
HER OIL CROPS	375.	20.0	9.0	5.0	5.0	5.0	6.0	7.0	7.0	7.0	7.0
TOTAL OIL CPS	203.	3989.6	4962.8	5151.4	4582.2	6153.4	5633.1	6548.0	6909.4	6970.2	6429.4
EP FLAX	2344.	425.0	399.0	432.0	380.0	346.0	480.0	461.0	495.0	402.0	487.0
A	940.	163.7	161.6	178.9	195.6	193.7	197.0	238.2	234.4	229.0	244.6
EF AND VEAL	2454.	3252.0	2964.0	3277.0	3741.0	3571.0	3917.0	4377.0	5091.0	5513.0	5569.0
RK	2252.	3276.0	3704.0	4011.0	4267.0	2913.0	4143.0	4465.0	4456.0	4079.0	4094.0
TTON AND KID	1824.	1019.0	1006.0	1062.0	1119.0	1052.0	1013.0	933.0	1029.0	1029.0	969.0
ULTRY	2268.	766.0	813.0	822.0	802.0	606.0	696.0	745.0	764.0	817.0	866.0
HER MEAT	3601.	360.0	313.0	290.0	266.0	245.0	197.0	184.0	186.0	210.0	272.0
TOTAL MEAT	2351.	8682.0	8700.0	9462.0	10195.0	8287.0	9956.0	10704.0	11515.0	11648.0	11770.0
LK	196.	61718.0	62565.0	63931.0	61248.0	63262.0	72563.0	75992.0	79920.0	82295.0	81540.0
GS (MILLION EGGS)	100.	27464.0	29309.0	30099.0	28523.0	26694.0	29068.0	31672.0	33921.0	35679.0	37190.0
OL	4650.	356.8	366.3	371.4	372.7	340.7	356.9	370.9	394.5	415.1	389.7
EY	1600.	210.6	248.0	205.0	219.0	214.0	291.5	228.3	211.1	204.1	178.6
LK COCOONS	5100.	29.7	28.9	30.6	33.9	33.3	34.8	34.7	36.9	36.1	35.7
CHANGES IN NUMBER OF LIVESTOCK											
TTLE (TH HEAD)	442.	1547.0	6297.0	4911.0	-1540.0	1723.0	6265.0	3675.0	56.0	-1432.0	-573.0
GS (TH HEAD)	173.	5231.0	9028.0	3262.0	-29106.0	11985.0	6733.0	-1548.0	-7161.0	-1820.0	7008.0
EEP AND GOATS(TH HEAD)	37.	-3660.0	4194.0	1912.0	-6850.0	-8896.0	4642.0	5726.0	2999.0	2100.0	-10338.0

1970	1971	1972	1973	1974	197
65653.4	66801.2	56373.5	70660.5	53793.3	38957.0
7916.7	8267.8	5370.0	6742.3	9763.6	5270.0
880.1	779.1	476.8	931.5	616.5	234.0
943.3	1074.3	1216.7	1237.6	1411.6	1481.6
6963.2	6324.1	7145.2	8412.8	9007.8	5204.8
9565.0	10008.2	9000.0	11002.2	9838.4	7465.6
26350.0	23010.4	23897.2	36156.2	37020.0	21962.8
1605.6	1597.2	1616.7	3289.3	2234.5	806.4
4952.0	4485.6	4335.7	5054.4	5557.8	2858.3
126.8	177.9	134.0	179.6	321.8	171.0
124652.1	123425.8	108566.7	144565.3	129564.2	84414.0
81461.4	77656.4	63230.4	92867.7	65831.5	73414.0
1189.0	1167.0	1117.0	1451.0	1389.0	1260.0
7483.0	7356.0	7037.0	9147.0	8733.0	7920.0
1294.0	1271.0	1214.0	1576.4	1513.0	1372.0
2291.0	2250.0	2154.0	2800.1	2680.0	2430.0
2015.0	1980.0	1892.0	2457.9	2357.0	2138.0
5558.0	5462.0	5231.0	6900.7	6500.0	5895.0
1378.0	1354.0	1296.0	1693.0	1639.0	1241.0
21212.0	20940.0	19941.0	25927.0	24811.0	22256.0
11690.0	12307.0	9570.0	13351.0	12441.0	13700.0
71335.0	64329.0	68043.0	77709.0	67471.0	64600.0
6990.0	7101.0	7296.0	7664.0	8403.0	7864.0
228.0	230.0	275.0	275.0	293.0	260.0
30.0	24.0	17.0	30.0	20.0	30.0
5652.5	5210.0	4644.2	6794.2	6241.3	4572.4
620.0	618.0	606.0	424.0	360.0	700.0
65.0	64.0	62.0	101.0	63.0	90.0
50.0	49.0	48.0	131.0	122.0	70.0
79.0	78.0	76.0	89.0	76.0	80.0
7.0	7.0	7.0	22.0	15.0	7.0
6402.5	6026.0	5643.2	7561.2	6877.3	5519.4
456.0	496.0	456.0	443.0	409.0	478.0
272.7	280.0	291.0	305.0	314.0	315.0
5393.0	5490.0	5715.0	5873.0	6394.0	6530.0
4543.0	5290.0	5411.0	5031.0	5515.0	5900.0
1002.0	997.0	901.0	954.0	974.0	1000.0
1071.0	1107.0	1203.0	1295.0	1420.0	1500.0
269.0	298.0	401.0	324.0	327.0	300.0
12278.0	13272.0	13633.0	13527.0	14620.0	15200.0
83016.0	83103.0	83181.0	90300.0	91760.0	90900.0
40740.0	45100.0	47910.0	51154.0	55509.0	57709.0
418.9	428.8	420.1	433.3	461.6	463.0
210.0	210.0	210.0	221.0	193.0	210.0
33.7	36.7	37.0	40.0	39.0	43.0
4063.0	3209.0	1573.0	2260.0	2956.0	1878.0
11428.0	3951.0	-4041.0	3439.0	2240.0	-14472.0
7618.0	1912.0	-643.0	3844.0	2698.0	-4332.0

APPENDIX TABLE 4

USSR: VALUE OF NET AGRICULTURAL OUTPUT, 1960-1975

Million Rubles (1970 Price Weights)

COMPONENT	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
FOOD GRAINS	4629.7	5779.5	5502.7	3771.6	5539.9	4925.4	8102.1	6403.0	7633.7	6005.6	7178.0	8406.7	6944.7	8603.3	7292.9	5149.3
FEED GRAINS	2492.4	3439.8	3350.8	2997.3	4054.1	2748.4	3568.1	3590.5	3703.9	4370.5	4562.3	4277.2	4288.8	5978.3	5977.9	3508.2
TOTAL GRAIN	7122.1	9219.4	8853.5	6769.9	9594.0	7673.8	11670.2	9993.5	11337.5	10466.2	12740.4	12684.0	11133.5	14671.5	13170.7	8657.5
POTATOES	7638.0	7683.6	6058.8	6349.0	8834.1	8243.7	8197.5	9078.4	9851.0	8708.3	9286.6	8852.8	7219.7	10599.3	7504.9	8369.3
VEGETABLES	2625.2	2599.0	2571.7	2308.1	3016.4	2836.3	2907.3	3188.5	3050.2	3003.9	3460.0	3359.4	3252.2	4227.6	4047.1	3646.1
OIL CROPS	780.1	994.9	1045.5	931.7	1215.5	1108.1	1312.1	1399.7	1419.1	1275.9	1314.9	1227.9	1116.6	1517.7	1373.1	1143.2
FRUITS BERRIES NUTS	1392.6	1424.1	1685.8	1937.9	1936.2	2284.2	2201.0	2528.4	2995.1	2669.7	3296.6	3470.6	2698.7	3765.0	3509.4	3963.4
SUGARBEETS	1357.1	1241.3	1142.6	1077.9	1979.2	1755.0	1812.6	2121.1	2199.4	1697.4	1956.0	1672.6	1769.1	2022.8	1754.2	1609.4
COTTON	2380.4	2507.5	2398.7	2891.5	2933.2	3142.4	3319.5	3313.3	3299.5	3167.9	3923.9	3941.1	4049.3	4253.5	4667.0	4364.5
TOBACCO	233.6	214.9	208.6	212.8	254.5	383.8	352.5	371.3	448.5	448.5	475.6	479.9	573.6	573.6	611.2	542.4
MAKHORKA	41.9	40.7	19.2	17.5	16.3	25.0	25.0	22.1	18.6	26.9	22.7	14.0	0.0	17.5	11.6	17.5
FIBER FLAX	996.2	935.3	1012.6	890.7	811.0	1125.1	1080.6	1136.9	942.3	1141.5	1068.9	1139.2	1069.9	1038.4	958.7	1120.4
TEA	153.9	151.9	168.2	183.9	182.1	195.2	223.9	220.3	215.3	229.9	256.3	263.2	273.5	286.7	295.2	296.1
TOTAL CROPS	24722.2	27012.6	25155.1	23439.8	30772.5	28762.7	33102.2	33373.6	35765.4	32935.9	37501.8	37144.4	33165.1	42972.6	37901.9	33629.8
MEAT	20359.3	20256.9	22002.4	23687.8	19334.2	23111.6	24924.9	26857.7	27282.6	27683.6	28707.7	31111.7	32150.8	31928.1	34402.9	35664.1
MILK	12096.7	12262.7	12530.5	12004.6	12399.4	14222.3	14804.4	15664.3	16129.8	15981.8	16271.1	16303.9	16303.5	17306.8	17985.0	17796.8
EGGS	2746.4	2930.9	3008.9	2852.3	2669.4	2906.8	3167.2	3392.1	3567.9	3719.0	4074.0	4510.0	4791.0	5115.4	5550.9	5770.0
WOOL	1659.1	1703.3	1727.0	1733.1	1584.3	1659.6	1724.7	1834.4	1930.2	1812.1	1947.9	1963.9	1953.5	2014.8	2146.4	2152.9
HONEY	337.0	396.8	328.0	350.4	342.4	466.4	365.3	337.8	326.6	285.8	336.0	336.0	336.0	353.6	319.4	336.0
SILK COCOONS	151.5	147.4	156.1	172.9	169.8	177.5	177.0	188.2	184.1	182.1	171.9	187.2	188.7	204.0	198.9	219.3
LIVESTOCK CHANGE	1453.3	4327.3	2805.7	-5969.5	2506.2	4105.7	1568.4	-1103.1	-870.1	576.6	4054.8	2172.6	-166.5	1736.1	1749.7	-1933.9
GROSS LIVESTOCK PROD	38803.3	42025.3	42558.6	34831.5	39005.6	46649.9	46821.8	47171.4	48551.1	50241.0	55653.3	56615.3	55557.0	58558.9	62352.1	60135.3
NET LIVESTOCK PROD	32425.3	35400.6	35497.1	28672.9	31981.2	37864.8	38491.8	37632.5	39050.8	40162.0	45299.6	45861.8	44412.1	46188.4	50119.3	46971.3
TOTAL NET FARM OUTPUT	57147.5	62413.2	60652.2	52111.7	62753.7	66627.5	71594.0	71006.0	74816.2	72997.0	82900.4	83006.2	77577.2	89161.0	88021.2	80601.1